Health&Safety Manual

Supplement 2.21

Implementation Guide for the Unresolved Safety Question Process

September 1994

Approved by the ES&H Working Group

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Unresolved Safety Question Process*

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1.0 Introduction

This supplement provides guidelines for implementing DOE Order 5480.21, "Unreviewed Safety Questions," at the facility level. The primary purpose of this order is to preserve the DOE authorization basis (see Appendix A for definition) for each LLNL nuclear facility while allowing for operational flexibility.

The concept of an Unresolved Safety Question (USQ) was established to allow contractors (e.g., LLNL) to make physical, procedural, and operational changes (see Appendix A for definition) to facilities and to conduct tests and experiments without prior approval from DOE, provided that such changes do not explicitly or implicitly affect the facility's authorization basis or result in a change to a technical safety requirement (TSR) or operational safety requirement (OSR). Any proposed change to a TSR or OSR requires DOE approval and must be made in accordance with DOE Order 5480.22, "Technical Safety Requirements." A change that results in the facility being outside its authorization basis involves a USQ.

An inadequacy in safety analysis documentation is another type of USQ issue that may be a result of new information, facility behavior under off-normal conditions, or a discrepancy. The USQ process in this case determines if the inadequacy places the facility outside its authorization basis, if corrective actions are necessary, and the extent to which DOE should be involved.

2.0 Applicability

This supplement is applicable to

- aspects of safety documented in the authorization basis for all nuclear facilities at LLNL; these include hazardous material, radiological hazards, procedures, and hardware.
- changes to nuclear and non-nuclear safety-related equipment and supporting systems for a facility relied upon in the authorization basis;
- any change that has the potential to alter the ability of a structure, system, or component (SSC) to meet its expected safety-related performance (as described in the safety analyses);

- non-safety-related systems if a change could (1) affect the proper operation of SSCs required for facility authorization; (2) lead to an off-normal event, indirectly resulting in the release of hazardous or radioactive material; or (3) nullify an assumption made in the safety analyses.

Specific issues within the purview of this procedure include

- corrective actions or improvements affecting the facility or procedures, as described in safety analyses;
- new or modified tests, experiments, or operations not bounded by existing safety analyses;
- unanalyzed conditions, errors, or discrepancies in documents, between documents, or between a document and the facility;
- the results of new analyses or re-analyses that predict
  - — probabilities or consequences that exceed those described in existing safety analyses;
  - — a reduction in the existing margins of safety associated with a TSR or an OSR.

The procedures in this supplement generally are not applicable to industrial-type hazards, such as those associated with electrical equipment or high pressure, unless such hazards could increase the risks from hazardous or radioactive materials.

3.0 Requirements/ Regulatory Summary

The requirements of this supplement are based on DOE Order 5480.21.

4.0 Process for Compliance

4.1 General

The USQ process establishes the appropriate approval level for issues within the purview of this procedure. If the issue involves a USQ, the risks are increased and DOE approval is required; if an issue does not involve a USQ, then LLNL approval is adequate.

A USQ is considered to exist

- if the probability of occurrence or the consequences of an accident, or the malfunction of equipment important to safety (and previously evaluated by safety analyses), could be increased;
- if the possibility for an accident or a malfunction of a different type from that evaluated in safety analyses could be created or is identified;
- if any margin of safety could be reduced, as defined in the basis for any TSR or OSR.

The two types of USQ issues are (1) "forward-looking" issues, which consider proposed future changes, tests, or experiments; and (2) inadequacies in the safety analysis documentation, which consider newly discovered information, unanalyzed conditions, or discrepancies. The procedures in Sections 4.2 and 4.3 must be followed whenever any of these issues exists. Figure 1 gives a summary of these procedures.

An issue can enter the USQ process if changes are made in the facility or to its hardware, procedures, or operations. Such changes may result from improvements arising from self-assessments, DOE inspections, new criteria, occurrence reports, non-conformance items, non-reportable operating occurrences, or from the discovery of an inadequacy. New or modified tests or experiments may require new hardware, new procedures, or for the facility to be operated differently (e.g., with more material). They may also create new risks (e.g., a new material is introduced). New hardware or new operations may require new procedures, so a single change may feed into the USQ process through multiple channels.

An issue can also enter the USQ process if an inadequacy exists in the safety analyses. This type of USQ may be a result of new information, facility behavior under off-normal conditions, or the discovery of a discrepancy.

As a minimum, the screening questionnaire in Appendix B shall be used to identify changes or situations that require a safety evaluation and that may ultimately involve a USQ. Changes to a nuclear facility that have the potential of affecting the authorization basis require a safety evaluation. All confirmed inadequacies require a safety evaluation.

4.2 Proposed Changes

The facility manager must be notified of any hardware or procedure change (temporary or permanent) planned for an LLNL nuclear facility or of any new or modified test, experiment, or operation. Nuclear facilities shall address the specifics of this process in their facility safety procedures (FSPs).

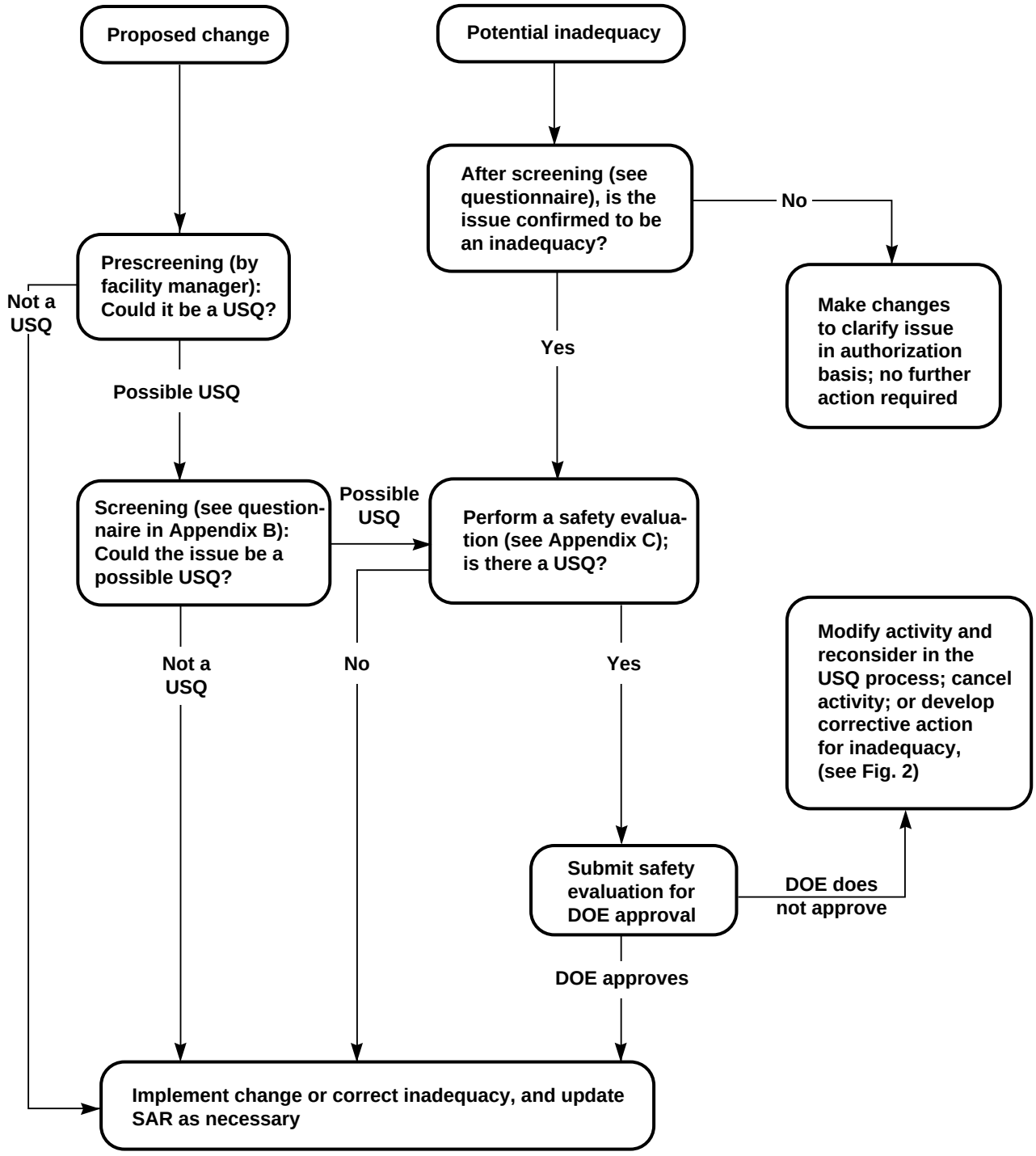

Figure 1. USQ Determination Process.

When a change is proposed, the facility manager will determine whether the change is safe. A change determined to be safe must enter the USQ process (identified as "prescreening" in Fig. 1.) so that the impact on the authorization basis can be evaluated and the appropriate approval level can be ascertained. An unsafe change should be canceled or appropriate modifications should be made to make it safe. Then the change must be entered in the USQ process to determine the effect on the facility's authorization basis. Determination of whether a change is safe or unsafe must be made early in the design phase and/or prior to procurement.

If after prescreening it is obvious that the change will not impact the authorization basis, then the facility manager can exclude the change from the process and implement the change. If the change is not excluded by prescreening, it should enter the screening stage (see Appendix B) to determine if a safety evaluation is required. If there are sufficient reasons to exclude the change from the process after screening, those reasons must be documented, then the change can be implemented. If the change is not excluded by screening, a safety evaluation must be performed.

A safety evaluation is required if

- the change could impact the facility or its procedures, as described in the authorization basis;
- any new or modified test, experiment, or operation could introduce hazards of a different type or magnitude not considered in or bounded by existing safety analyses;
- the change could reduce the margin of safety, as defined in any TSR or OSR.

Safety evaluations must be performed and documented in accordance with the requirements of this supplement, reviewed by a qualified individual, and approved by the facility manager.

If the safety evaluation determines that a proposed change involves a USQ,

- document the basis for this determination;
- submit the safety evaluation to DOE;
- contact the DOE facility representative at the Oakland Operations Office (OAK) to obtain DOE's approval before implementing the change;
- incorporate any changes or actions taken as a result of the safety evaluation into the existing SAR during the next revision.

If no USQ is involved, the change can be implemented without DOE's approval. A safety evaluation must be completed and documented before physical changes to the facility can be implemented and revised procedures can be released for use. Such changes should be incorporated into the SAR, as appropriate. Irrespective of whether a USQ is involved or not, additional actions and approvals (e.g., funding, internal approvals, etc.) may be required before the change can be implemented.

The USQ process does not supersede or exclude a change from consideration in the National Environmental Policy Act (NEPA) process. This is a separate process, and appropriate actions should be taken to comply with the necessary requirements.

4.3 Inadequacies in Safety Analyses

If the understanding of risks associated with a facility's operation is found to be incomplete or inaccurate, then the facility's safety analyses may be inadequate. The safety analyses supporting the current or interim authorization basis may not be bounding, and the inadequacy may present risks greater than those in the existing safety analyses. For example, the facility may have a potential unanalyzed event that compromises safety or a condition that is outside the facility's authorization basis. In addition, a discovered inadequacy could result in a reduced margin of safety.

An inadequate safety analysis may be due to three general sources:

1. Receipt of new information, including vendor notifications regarding potential performance problems with equipment, technological advances, discovery of inaccuracies or omissions in the analysis, recognition that a postulated accident would exceed the current safety analysis, or new DOE safety requirements.

2. The occurrence of an event that may lead to the conclusion that the safety analyses are invalid because (a) the event did not unfold as documented; (b) the facility did not respond as expected; or (c) the consequences exceeded the bounds of previously analyzed events.

3. Discovery of an "as-found" condition, where the actual physical configuration and the assumed physical configuration in the safety analysis do not agree.

4.3.1 Determining Inadequacies

The facility manager must be notified of any potential inadequacies in the safety analyses. He/she shall then assign a qualified individual to quickly confirm the inadequacy using the questionnaire in Appendix B. DOE-OAK must be informed as soon as an inadequacy is confirmed.

Inadequacy does not exist. No action is required if the issue does not represent an inadequacy. However, the safety analyses should be corrected or clarified in the next revision of the SAR so that the issue does not recur.

Inadequacy confirmed. The facility manager shall do the following for confirmed inadequacies:

- Determine whether to take action, including shut down, to ensure safe operation. Take appropriate steps if necessary.
- Notify the appropriate management within LLNL of the situation (this individual will then notify DOE-OAK).
- Assign a qualified person(s) to perform a safety evaluation.

If the safety evaluation determines that a USQ is involved, submit the evaluation to DOE for approval, re-evaluate the safety of the current configuration, and confirm that appropriate action has been taken to place the facility in a safe condition.

USQ Exists But Configuration with Inadequacy Is Safe. The facility manager shall do the following if he/she believes that the situation with the inadequacy is safe:

- Report the inadequacy as an unusual occurrence, clearly indicating that the issue is associated with a USQ (see Chapter 4 of the *Health & Safety Manual*);
- Request approval from DOE for continued interim operation with the inadequacy;
- Correct the inadequacy and/or include the information from the safety evaluation in the SAR during the next scheduled revision.

USQ Exists But Configuration with Inadequacy Is Unsafe. The facility manager shall do the following if the situation with the inadequacy is unsafe:

- Report the inadequacy as an unusual occurrence, clearly indicating that the issue is associated with a USQ (see Chapter 4 of the *Health & Safety Manual* for guidance).
- Develop short-term corrective actions, if necessary, and obtain DOE's approval for interim operation;
- Develop long-term corrective actions, if necessary (any change will probably require review through the USQ process); obtain DOE's approval for the revised authorization basis if any corrective actions are determined to be USQs.

- Remove any operating restrictions, provided that this action will return the facility's operations to within the authorization basis (see Supplement 2.31 of the *Health & Safety Manual* for guidance on restart).
- Correct the inadequacy; include information from the safety evaluation and any corrective actions in the revised SAR, and obtain the necessary approvals.

No USQ Exists. The facility manager shall do the following if a USQ does not exist:

- Submit the safety evaluation to DOE (for information purposes only); this evaluation will provide DOE with (1) an understanding of the risks associated with operating with the inadequacy, and (2) how the facility arrived at the condition so that it can be prevented in the future.
- Return to normal operations (i.e., remove any restrictions) following appropriate procedures. If the facility was shut down to allow for the investigation of a potential USQ, restart should begin after completing the safety evaluation. See Supplement 2.31 of the *Health & Safety Manual* for restart procedures, if necessary.
- Correct the inadequacy and/or include the information from the safety evaluation in the SAR during the next revision.

Figure 2 provides a summary of the procedure described in this section.

4.3.2 As-Found Conditions

When an as-found condition may have been created by an unevaluated or incorrectly evaluated change, the USQ process must be applied in a "backward-looking" manner. For example, if a change was already implemented but a safety evaluation was not performed, there is no need to modify the change. However, a safety evaluation must be completed because the impact of the change on the authorization basis may not have been considered when implemented. In this case, the USQ process must be applied to ensure that the authorization basis is maintained and to ascertain whether LLNL is authorized to grant final approval of the change. It is necessary to consider the current physical configuration of the facility as if the change were a proposed modification.

If a USQ exists for an as-found condition,

- submit the safety evaluation to DOE for approval;
- obtain approval for interim operation of the facility in its current configuration, or limit operation to that specified in the authorization basis;

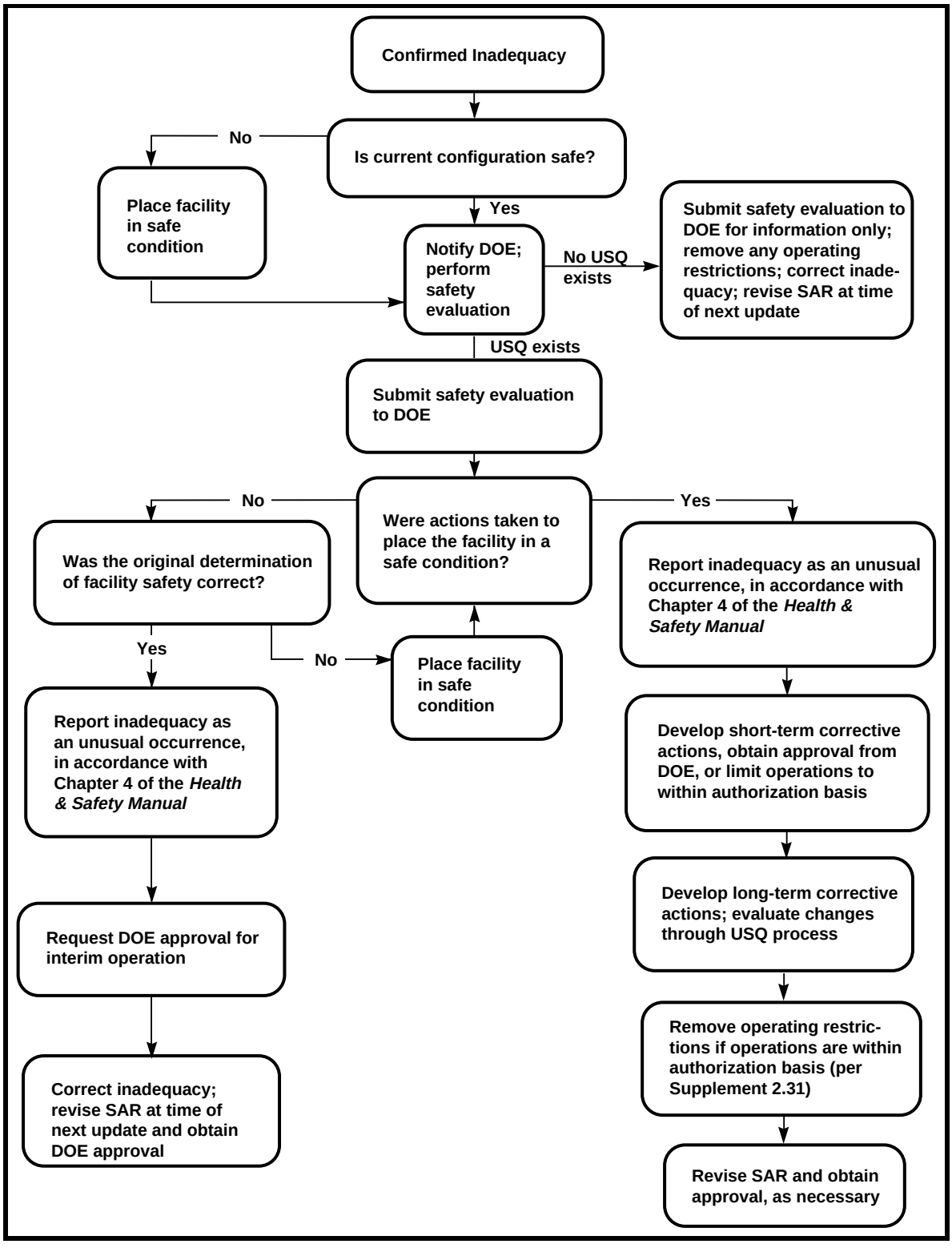

Figure 2. Operational interface for inadequate safety analysis USQ process.

- correct the inadequacy and/or include the information from the safety evaluation in the SAR during the next scheduled revision.

If no USQ exists, LLNL is authorized to grant final approval of modification to the facility. The USQ process resolves any discrepancy and justifies the current configuration of the facility. The safety documentation should be updated to reflect the current condition.

In some cases, when an as-found condition is uncovered, the cause leading to the condition can be identified and corrected quickly—at least on an interim basis. However, the condition must still be evaluated through the USQ process and any interim actions taken must be approved by DOE. The USQ process is important for inadequacies that are easy to resolve because it (1) informs DOE of all the risks associated with the operation of the facility; (2) allows DOE the opportunity to review and approve the corrective actions to ensure adequacy and completeness, and (3) allows DOE to ensure that the risks being mitigated by the corrective actions are recorded as part of the approved authorization basis.

4.4 Prescreening and Screening

Prescreening and screening should help identify those issues that, by broad definition, enter into the USQ process but for which a detailed safety evaluation is not required.

4.4.1 Prescreening

The initial screening of a proposed change (identified as "prescreening" in Fig. 1) is based on the facility manager's judgment. This judgment requires knowledge of the facility's characteristics, operations, procedures, and authorization basis, as well as knowledge of the issue under consideration and the USQ process. The facility manager shall review each modification to the facility and its procedures, including proposals for new operations at the facility. He/she may prescreen from further consideration those changes determined to be entirely unrelated to the facility's safety SSCs and/or the authorization basis and which, by functional and spatial separation, will not affect the SSCs and/or the authorization basis. Prescreening can result in a determination that there is no USQ if it is obvious that the authorization basis will not be impacted by the change.

Following are physical changes to a nuclear facility that do not require further assessment:

- Changes to components or parts of the facility not described or relied on in the safety analyses.

- Changes that cannot cause the release of hazardous or radioactive material, either directly or indirectly.

- Changes to office areas that do not contain hazardous or radioactive material, or to office areas that do not contain equipment used for processing or controlling such material.

Other changes not requiring further USQ review include the following:

- Routinely planned and performed maintenance activities that do not need modification, and that return the facility to its original condition prior to maintenance. The functional condition of such activities should continue to meet or exceed those performance capabilities set forth in the authorization basis. Examples of such maintenance activities include calibration, refurbishment, and replacement of a component with an equivalent one.

- Changes to procedures not contained or described in the safety analyses, unless the change process uncovers a link to safety-related equipment or the authorization basis.

- Changes to procedures listed but not described, outlined, or summarized in the safety analyses, unless the change process uncovers a link to safety-related equipment or the authorization basis.

- Changes to procedures that correct typographical errors, spelling, or grammar, or that provide clarification or additional reference(s). These changes are considered inconsequential and do not require a safety evaluation.

It may be possible to categorically exclude changes not specifically described in this procedure from future consideration in the USQ process. A specific activity (or group of activities) that does not impact safety or the authorization basis can be evaluated once through the USQ process to confirm exclusion. The safety evaluation should provide a convincing argument of why a one-time categorical exclusion is acceptable.

4.4.2 Screening

If the facility manager's prescreening does not eliminate the issue from the USQ process, a more formal screening is required. As a minimum, the questionnaire in Appendix B shall be used to identify those issues that do not require a safety evaluation. A graded approach should be applied when completing this questionnaire, and questions should be answered only to the level of detail consistent with the authorization basis. When it is not immediately obvious whether the change impacts the authorization basis, the reasons for excluding the change (as determined from a safety evaluation) should be documented and well supported. The reasons for not performing a safety evaluation can be provided as part of, or as a supplement to, the screening questionnaire. The completed questionnaire must be reviewed by a qualified person and approved by the facility manager.

Changes that cannot be screened from the USQ process are (1) physical changes made to equipment with a safety function (e.g., a continuously operating negative pressure high efficiency particulate air [HEPA] filter system), (2) physical changes made to equipment that directly handles or controls material in process, or (3) physical changes that could indirectly impact the equipment. Exceptions to this requirement may be physical modifications to experimental apparati or gloveboxes. The screening questionnaire may be applied in these specific cases to determine if a safety evaluation is required.

4.5 Safety Evaluations

The purpose of safety evaluations is to ascertain if there will be an increase in the risks associated with an issue beyond that documented in the authorization basis. Changes that impact the design and performance of a facility may affect the probability and/or consequences of accidents, as described in the safety analyses; create accidents of a different type; or reduce the margins of safety, as defined in the TSRs or OSRs. By analyzing identified inadequacies or previously unanalyzed conditions, a facility may uncover accident consequences or probabilities greater than those documented in the authorization basis or margins of safety that are less than those documented. Determination of whether a USQ exists requires consideration of the documents that make up the authorization basis and knowledge of the issue at hand. As a minimum, the questionnaire in Appendix B shall be used to identify issues requiring a safety evaluation.

A safety evaluation must provide a comprehensive justification for the USQ determination and demonstrate that the proposed activity either does or does not (1) increase the probability or consequences of an accident considered in the safety analyses; (2) create an accident or malfunction of a different type than that considered in the safety analyses; or (3) reduce the margin of safety defined by the acceptance limits and bases of TSRs or OSRs. The explanation must be complete so that a qualified independent reviewer could draw the same conclusions from the evaluation. All factors considered and assumptions made by the evaluator (e.g., experience and engineering knowledge/judgment) must be clearly stated. Supporting reference documents should be listed. The Safety Evaluation Worksheet (Appendix C) provides guidance on the scope of documentation, which should be in the form of attachments to this worksheet. This appendix also includes background information to support the worksheet. Appendix D provides examples of issues evaluated using the USQ process described in this supplement.

If there is a prior evaluation that fully addresses the current issue, a safety evaluation is not required. But the existing evaluation should be reviewed to ensure that it adequately covers the issue. Use of the existing evaluation as a

basis for not preparing a new one should be documented, and the existing evaluation should be referenced.

A graded approach should be applied when preparing safety evaluations. Any analysis performed as part of a safety evaluation should be to the same level of rigor as that for the authorization basis.

4.6 Documentation Requirements

Documentation is not required for issues prescreened from the USQ process. The outcome of issues that enter the screening process, including who reviewed and approved the decision, are recorded on the questionnaire.

Below is a summary of the documentation requirements for safety evaluations.

- Safety evaluations and their conclusions must be documented to include the technical details of the analysis. Documentation must
  - — be sufficient to support the conclusion so that an independent reviewer can follow the reasoning and arrive at the same conclusion;
  - — include a list of references;
  - — identify who performed, reviewed, and approved the evaluation (see Appendix D for examples);
  - — be retained for the operating period of the facility.

- The reasons for using an existing safety evaluation covering the issue should be documented and the existing safety evaluation referenced. The issue can then be screened from further evaluation.

- It is recommended that a numbering system be established for safety evaluations to track and easily identify the documentation. The documentation should include the building number, the year, and the safety evaluation number for that year (e.g., issue number 332-94-002 would be the second issue for which a safety evaluation was performed for Building 332 in 1994).

- Each year, facilities must submit a report to DOE summarizing the activities for which a safety evaluation was performed. Submittal should be on a schedule corresponding to the periodic review of the SAR. Issues that were not previously reported up to 6 months before the SAR submittal date (or the review date) should be included.

- Approved safety evaluations should become addenda to the SAR or current authorization basis. These evaluations, including any changes needed as a result of the USQ safety evaluation, must be incorporated into the SAR during the next scheduled revision.

5.0 Responsibilities

Each organization responsible for managing a designated nuclear facility shall

- identify the facility authorization basis;
- prescreen the issue and determine whether it should enter the formal USQ process if a change is proposed;
- assign a qualified person to determine if a safety evaluation is required for proposed changes that are not eliminated by the prescreening phase;
- assign a qualified person to prepare and review the safety evaluation for issues that require one and for confirmed inadequacies;
- approve safety evaluations;
- submit safety evaluations for positive USQs to DOE for approval;
- if a potential inadequacy is identified, take the necessary action to confirm that the issue is an inadequacy;
- if an inadequacy is confirmed, determine the safety of the facility;
- if after confirming an inadequacy the facility is considered to be in an unsafe condition, take the necessary action to make the facility safe;
- inform DOE if an inadequacy is confirmed;
- report existing inadequacies determined to be positive USQs as unusual occurrences;
- ensure that facility-specific USQ-related documentation is maintained, facility personnel are trained, qualified safety evaluation preparers and reviewers are identified, and that the SAR is updated during the annual review to reflect issues considered in the USQ process;
- as part of the annual SAR review, provide DOE a summary report of issues for which a safety evaluation was performed which did not result in a positive USQ.

6.0 Qualifications and Training

Anyone who performs or reviews USQ screenings and safety evaluations must demonstrate to the facility manager that he/she

- is knowledgeable of the facility; the facility's authorization basis; the facility's characteristics and operations, procedures, and tests or experiments as described in existing safety analyses; and TSRs or OSRs.
- understands the design basis of the system(s) involved;
- is familiar with the requirements of the procedures in this supplement.

Each nuclear facility manager shall develop a list of personnel authorized and qualified to make USQ determinations. Personnel responsible for performing, reviewing, or approving USQ determinations are required to receive training on the application of the procedures in Sections 4.2 and 4.3. Courses also available include HS0037, "USQ Awareness and the USQ Process," and HS0038, "Preparation of USQ Safety Evaluations." Refresher training should be taken every two years.

7.0 References and Supporting Standards

Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, DOE-STD-1027-92, December 1992.

Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports, DOE-STD-3009-94, July 1994.

Evaluation Guidelines for Accident Analysis and Safety Structures, Systems, and Components, DOE-STD-3005-YR, Proposed, February 1994.

Appendix A

Definition of Terms

acceptance limits	Bounding consequences, probabilities, and maximum parameter values in the authorization basis on which approval for operation is based. The acceptance limits on consequences and probabilities define the maximum accident risk. The acceptance limits on parameter values define the bounding conditions for safe operation. TSRs may protect such values from being exceeded. To give more operational flexibility, an acceptance limit may be established based on engineering judgment at a value different from that which can be derived from the accident analysis. The acceptance limits should be documented in the bases for TSRs.
accident	For USQ purposes: an anticipated operational transient or postulated design-basis event considered credible to warrant inclusion in the SAR or in any other document that is part of the authorization basis.
accident analyses	For USQ purposes: those bounding analyses selected for inclusion in the SAR or that appear in any other document that is part of the authorization basis.
authorization basis	Those aspects of the facility design basis and operational requirements that DOE relies upon to authorize initial and/or continued operations, and that are considered to be important to the safety of facility operations. The authorization basis should • be supported by safety analyses that identify the hazards and evaluate the potential accident(s) and associated risks; • justify the adequacy of the methods used to eliminate, control, or mitigate the identified hazards; • be described in documents such as the facility SAR and other safety analyses; hazard analysis/classification documents; TSRs (OSRs, in older SARs); DOE-issued safety evaluation

	reports; and facility-specific commitments made to comply with DOE orders or policies. If the SAR is being upgraded or developed, the authorization basis may primarily be found in a Basis for Interim Operation or Justification for Continued Operation.
change	A physical modification to a facility (temporary or permanent); a modification to a facility procedure; or new or modified tests, experiments, or a change in the manner in which a facility is being operated.
design basis	A set of requirements that bounds the design of systems, structures, and components within a facility. These design requirements include consideration for safety, plant availability, efficiency, reliability, and maintainability. Some aspects of the design basis are important to safety, although others are not.
design-basis accidents	Accidents that are considered credible and of sufficient consequence to be postulated for the purpose of establishing design and performance requirements for systems, structures, and components important to safety.
equipment important to safety	Any piece of equipment at a facility that is required to (1) contain radioactive or hazardous material, (2) prevent the release of such material, or (3) mitigate the consequences of a release, as documented in the authorization basis.
facility	The term facility is used in various ways at LLNL. It may apply to a single room or laboratory, a single building, or to a collection of buildings. Each facility required to comply with this procedure must clearly define its boundaries, if not immediately obvious.
facility manager	The facility manager is the person whom the facility Associate Director (AD) has delegated responsibility for facility operations. The facility manager shall • ensure that applicable elements of Conduct of Operations are implemented in the facility or, if necessary, assign others to implement those elements;

- concur with the approval of FSPs and OSPs for activities in facilities requiring such procedures;
- implement the requirements specified in the FSP and Laboratory ES&H Manuals (*Health & Safety Manual* and *Environmental Protection Handbook*) as they pertain to facility equipment and operations;
- define and communicate facility-specific training requirements;
- ensure that employees on the facility operations staff meet assignment-specific training requirements;
- implement the self-assessment plan for the facility and see that the necessary corrective actions are taken;
- take all actions necessary to address facility, environmental, safety, and health (ES&H) concerns, including maintenance and repair of facility safety-related and environmental protection systems;
- develop and implement, when required, emergency response and self-help plans and procedures;
- perform other facility-related duties as may be assigned by the facility AD.

issue — Any change or identified inadequacy.

margin of safety — That margin built into the safety analyses of the facility as set forth in the acceptance limits for the authorization basis. This is the range above the acceptance limit but below a system's limitation, an unacceptable condition, or a critical level of safety significance. For example, for a pressure vessel, this margin is between the acceptance limit pressure as documented in the authorization basis and the failure pressure of the vessel. For an inventory-based TSR, which may be required to ensure an initial condition, the margin would be the range between the acceptance limit (or maximum inventory) corresponding to the maximum dose as de-

termined in the safety analyses and the inventory corresponding to the maximum allowed dose (e.g., regulatory limit or some maximum acceptance criterion).

non-reactor nuclear facility

A facility whose activities involve radioactive and/or fissionable materials in such form and quantity that a nuclear hazard potentially exists to employees or the general public. Such activities include

- operations that produce, process, or store radioactive liquid or solid waste, fissionable materials, or tritium;
- operations that involve isotope separation;
- irradiated materials inspection, nuclear fuel fabrication, decontamination, or recovery operations;
- nuclear fuel enrichment operations;
- environmental remediation or waste management activities that involve radioactive materials.

Incidental use and generation of radioactive materials in a facility's operation (e.g., check and calibration sources, use of radioactive sources in research and experimental and analytical laboratory activities, electron microscopes, and x-ray machines) would not ordinarily require the facility to be included in this definition. Accelerators and reactors and their operations are not included. Nuclear facilities are classified as Category 1, Category 2, or Category 3—with Category 1 facilities having the greatest hazards. These categories are based on DOE-STD-1027-92.

nuclear facility

All reactor and non-reactor nuclear facilities.

operational safety requirements (OSRs)

The requirements that define the conditions, safe boundaries, and the management or administrative controls necessary to (1) ensure the safe operation of the facility, and (2) reduce the potential risk to the public and facility workers from uncontrolled releases of radioactive or other hazardous materials, or from radiation exposures due to inadvertent

criticality. (These are now known as TSRs for non-reactor nuclear facilities and Technical Specifications (TSs) for nuclear reactor facilities.) See DOE Order 5480.22.

safety analysis

A documented process that

- systematically identifies the hazards within a given operation;
- describes and analyzes the adequacy of the measures taken to eliminate, control, or mitigate identified hazards;
- analyzes and evaluates potential accidents and their associated risks.

safety analyses

The set of safety documents that defines those aspects of design and operation important to safety, and upon which DOE relies to limit the risks associated with the operation of a facility to an acceptable limit and to permit operation. These documents represent LLNL's commitment to DOE of how the facility will be operated. The SAR is the primary document containing the safety analyses; ideally, all changes made to a facility are analyzed and documented in the facility SAR. Often, many changes take place at a facility but the supporting analysis and documentation are not integrated into a single SAR. Thus, the safety analyses or authorization basis may not be reflected in totality in the SAR but may reside in several different documents.

safety analysis report (SAR)

The report that

- summarizes the hazards associated with the operation of a particular facility;
- analyzes accidents associated with the hazards;
- provides an assessment of the risks associated with facility operation;
- defines the minimum safety requirements.

The SAR documents the adequacy of the safety analysis for a nuclear facility and demonstrates that activities, including construction, operation and maintenance, shutdown, and decommissioning,

	are conducted in accordance with ES&H objectives. See DOE Order 5480.23.
safe condition	A situation that has, or is thought to have, acceptable risk. For a situation where an inadequacy has been identified, a safe condition is one that does not have the potential to exceed evaluation guidelines (see DOE-STD-3009-94 and DOE-STD-3005-YR (proposed)).
safety related	Equipment that may directly or indirectly have an impact on safety, and that is required in the authorization basis to prevent accidents or mitigate accidents to acceptable levels. Procedures described, outlined, or summarized in the authorization basis, or procedures that are associated with safety-related equipment.
safety evaluation	The assessment required by DOE Order 5480.21 in support of the review of an issue. The record of the assessment should contain the logic and technical basis for determining whether a USQ exists. This may also be referred to as a USQ determination.
SSC	Structure, system, or component.
technical safety requirements (TSRs)	Those requirements that define the conditions, safe boundaries, and management or administrative controls necessary to (1) ensure the safe operation of a nuclear facility, and (2) reduce the potential risk to the public and facility workers from uncontrolled releases of radioactive or other hazardous materials, or from radiation exposures due to inadvertent criticality. (Formerly known as OSRs for non-reactor nuclear facilities and TSs for nuclear reactor facilities.) See DOE Order 5480.22.

Appendix B

Screening Questionnaire

B.1 General Instructions

This questionnaire consists of four sections, each beginning with a general question to determine if the remaining questions within that section are applicable. If the answer to the initial question is "Yes", continue to answer the remaining questions in that section. If the answer is "No", do not continue with the questions in that section; proceed to the next section. Continue in this manner through the four sections of the questionnaire.

Many changes in a facility affect safety SSCs in ways that are not immediately apparent. For example, changes may introduce new failure modes in support and auxiliary systems, place new kinetic energy sources (e.g., compressed gas) near safety systems, and alter seismic response characteristics. This questionnaire provides guidance for identifying issues that require additional review, including a safety evaluation, for USQ determination. The screening process in this questionnaire focuses the safety evaluation on issues that affect the facility's authorization basis, rather than on insignificant issues. Questionnaire preparers and reviewers must consider possible indirect and secondary effects on the facility's authorization basis, as well as the more obvious direct impacts.

A graded approach should be considered when answering the questions in this questionnaire. Respond to the questions only to the level of detail consistent with the authorization basis. If a question asks for details and the authorization basis does not include such details, indicate that the question is not applicable by placing "N/A" in the space provided.

If the issue involves a change to a TSR or an OSR, DOE approval is required. Thus, it is not necessary to complete this questionnaire or to perform a USQ safety evaluation.

Section I. Changes in Nuclear Facility

Are there physical changes to the nuclear facility or to the equipment as described in safety analyses?

Yes ☐ Answer the questions in this section No ☐ Go to Section II

Yes, or uncertain	No	
☐	☐	Does the temporary or permanent change alter the design, safety-related function, or method of performing the safety-related function of an SSC described in the safety analyses (either by text or drawing)?
☐	☐	Does the temporary or permanent change affect an SSC that is not explicitly described in the safety analyses but has the potential for altering the design, safety-related function, or method of performing the safety-related function of SSCs explicitly described in the safety analyses?
☐	☐	Does the change add or delete an automatic or manual feature of any safety-related SSC, or does the change convert an automatic feature of any safety-related SSC to a manual function?
☐	☐	Does the change introduce any new system interactions that could potentially lead to the release of hazardous or radioactive material, or that could potentially lead to the release of more hazardous or radioactive material than a release scenario already identified?
☐	☐	Does the change introduce any new system interactions that could potentially increase the probability of a release scenario already identified?
☐	☐	Does the change alter the seismic qualification, environmental qualification, or safety class of a safety-related SSC?
☐	☐	Does the change alter the missile, flood, or fire protection of any safety-related SSC?

Yes, or uncertain	No	
☐	☐	Does the change replace a safety-related component on equipment that is not of equivalent performance and operating characteristics as the old component?
☐	☐	Is this a non-routine maintenance activity that (1) may not return the facility to the same condition it was in prior to maintenance, (2) is not enveloped by current analyses, or (3) might violate a TSR?
☐	☐	Is this a maintenance activity that is not covered in existing safety analyses and that requires the operation of certain systems to prevent the release of hazardous or radioactive material (e.g., if a thermal transient could occur during maintenance and could result in a release, then operation of the cooling system would be required)?
☐	☐	Is this a maintenance activity that removes from service a system or component in a mode in which TSRs or OSRs apply, but for which allowed outage times or permitted reduction in redundancy are not defined in the TSRs or OSRs?
☐	☐	If the temporary or permanent change is to a mode of operation of the facility or to a facility process, does the change impact the authorization basis?
☐	☐	Although the ultimate modification may not impact the authorization basis, could changes (e.g., removing critical equipment from operation) impact the authorization basis while the modification is in progress?
☐	☐	If the modification is suspended at any point before completion, could this impact the authorization basis?
☐	☐	Does the proposed change introduce more or a different form of hazardous or radioactive material than was considered in existing safety analyses?
☐	☐	Does the change introduce any new hazardous or radioactive materials not considered in the safety analyses?

Yes, or uncertain	No	
☐	☐	Could the change increase the likelihood of a toxic or radiological spill, fire, explosion, or criticality from that considered in the existing safety analyses?
☐	☐	Could the change introduce new mechanisms by which toxic or radiological spills, fires, explosions, or criticality events could occur?
☐	☐	Could the change call into question any assumption made in any part of the safety analyses?
☐	☐	Does the change violate or affect the basis for any TSR or OSR such that (1) a new TSR or OSR may be required, (2) there would be an associated change to the SAR that involves a USQ; or (3) the way that the associated TSR or OSR could be met, applied, or interpreted is affected?
☐	☐	Does the change require a modification to any TSR or OSR (if so, DOE approval is required per DOE Order 5480.22)?

Go to Section II.

Section II. Changes to Procedures

Are there changes to safety-related procedures?

Yes ☐ Answer the questions in this section

No ☐ Go to Section III

☐	☐	Does the change impact a procedure outlined, summarized, or described in the safety analyses? Procedures that are only listed or referenced in a safety analysis do not require evaluation.
☐	☐	Is the change being made to an area of the safety analyses that defines or describes activities or controls concerning the conduct of work? Such modifications qualify as changes to procedures, as described in the safety analyses.

Yes, or uncertain	No	
❑	❑	Does the procedural modification implement an operational change (e.g., set point change)?
❑	❑	Does the procedural modification alter the basic functions to be performed by the original procedure?
❑	❑	Does the procedural modification alter the intent of a procedure or the method of accomplishing that intent?
❑	❑	Does the change to the procedure reassign responsibility to a less qualified individual?
❑	❑	Does the change to the procedure alter any systems or system interfaces in a way that could potentially affect the operability of SSCs?
❑	❑	Does the change violate or affect the basis for any TSR or OSR such that (1) a new TSR or OSR may be required, (2) there would be an associated change to the SAR that involves a USQ, or (3) the way that the associated TSR or OSR could be met, applied, or interpreted is affected?
❑	❑	Does the change require a modification to any TSR or OSR (If so, DOE approval is required per DOE Order 5480.22)?

Go to Section III.

Section III. Tests, Experiments, or New Operations

Does the activity involve new or modified tests, experiments, or operations that have not been previously evaluated?

Yes ❑ Answer the questions in this section

No ❑ Go to Section IV

❑	❑	Could the test, experiment, or operation potentially introduce more or a different form of a hazardous or radioactive material, or increase the quantity vulnera-

ble to release compared to what was considered in existing safety analyses?

Yes, or uncertain	No	
☐	☐	Could the test, experiment, or operation potentially introduce any new hazardous or radioactive material not considered in the safety analyses?
☐	☐	Could the test, experiment, or operation potentially increase the likelihood of a toxic or radioactive spill, fire, explosion, or criticality?
☐	☐	Could the test, experiment, or operation potentially introduce a new mechanism by which a toxic or radioactive spill, fire, explosion, or criticality could occur?
☐	☐	Could the test, experiment, or operation potentially affect safe operations by degrading the margins of safety during normal operations or anticipated transients, or by degrading the performance of SSCs that prevent accidents or mitigate accident conditions?
☐	☐	Is the activity a one-of-a-kind test used to measure the effectiveness of new techniques or a new system configuration that might affect equipment important to safety required in the safety analyses?
☐	☐	Is this a test subsequent to a modification that was not considered or included in the safety evaluation?
☐	☐	Does the test, experiment, or operation violate or affect the basis for any TSR or OSR such that (1) a new TSR or OSR may be required, (2) there would be an associated change to the SAR that involves a USQ, or (3) the way that the associated TSR or OSR could be met, applied, or interpreted is affected?
☐	☐	Does the test, experiment, or operation require a change to any TSR or OSR (if so, DOE approval is required per DOE Order 5480.22)?

Go to Section IV.

Section IV. Discovery of Potential Inadequacies

Has a potential inadequacy been discovered?

Yes ❑ Answer the questions in this section

No ❑ Go to B.2, "Final Instructions"

Yes, or uncertain	No	
❑	❑	If the vendor of a piece of safety-related equipment used at the facility has notified facility personnel that such equipment has experienced a malfunction or a failure under certain conditions, is this equipment in service?
❑	❑	If the vendor of a piece of safety-related equipment apparently used at the facility has notified facility personnel that such equipment has experienced a malfunction or a failure under certain conditions, do (or could) adverse conditions potentially exist in this particular application?
❑	❑	If the vendor of a piece of safety-related equipment apparently used at the facility has notified facility personnel that such equipment has experienced a malfunction or a failure under certain conditions, would the validity or adequacy of current safety analyses potentially be compromised if such equipment were to fail?
❑	❑	Has a technological advance occurred such that (1) information assumed in the safety analyses is less conservative than originally thought, and (2) the validity or adequacy of existing safety analyses is questionable?
❑	❑	Does an analytical error, omission, or other discovery result in (1) there potentially being a greater quantity of hazardous or radioactive material vulnerable to release, or (2) energy sources available for dispersion of such material being greater than originally imagined?
❑	❑	Has there been a discovery of an inaccurate calculation or incorrect assumption that could impact the analyses in a negative manner and make the validity of the existing safety analyses questionable?

Yes, or uncertain	No	
☐	☐	Has an important piece of safety-related information been omitted in previous safety analyses?
☐	☐	Has a potential new failure mechanism or new accident initiator been identified?
☐	☐	Has it been identified that the performance of a piece of safety-related equipment may be less than assumed in the authorization basis?
☐	☐	Has an actual facility condition been discovered that is potentially beyond the bounds of existing analyses?
☐	☐	Has a new requirement been imposed that could lead to the conclusion that current safety analyses potentially do not bound the risk of facility operation?
☐	☐	During an operational event, did the event progress differently than anticipated, and was it documented in existing analyses because of an invalid analysis or non-conservative assumptions?
☐	☐	During an operational event, were the bounds of existing analyses exceeded, or was it realized that the event could have reached consequences that exceeded those documented in the current safety analyses?
☐	☐	During an operational event, did the facility respond differently than expected, and was this response assumed in the safety analyses because of an invalid analysis or non-conservative assumptions?
☐	☐	Was a physical configuration assumed in the safety analysis incorrect at the time of preparing the safety analysis?
☐	☐	Has it been discovered that a physical modification which may affect safety has taken place at the facility and that this is not reflected in the safety analyses, or does the authorization basis inaccurately reflect the as-built condition of the facility?

❑ ❑ Is the physical configuration at the facility incorrect (i.e., the safety analysis correctly documents the way it should be)?

Yes, or uncertain	No	
☐	☐	Has a new requirement been imposed that has lead to a greater understanding such that the existing safety analysis does not fully bound facility operation (A new requirement does not necessarily make the existing analysis inadequate. This is only true if new information generated because of the new requirement question the adequacy of the original analysis)?
☐	☐	Does an analytical error, omission, or other discovery violate or affect the basis for any TSR or OSR such that (1) a new TSR or OSR may be required, (2) there would be an associated change to the SAR that involves a USQ, or (3) the way that the associated TSR or OSR could be met, applied, or interpreted is affected?
☐	☐	Does an analytical error, omission, or other discovery require a change to any TSR or OSR, or the development of new TSRs or OSRs (if so, DOE approval is required per DOE Order 5480.22)?

B.2 Final Instructions

The following steps may be necessary depending on the answers obtained from the questionnaire.

1. If all applicable questions in Sections I through IV were answered “No”, then the issue is not a USQ and can be removed from further consideration.

2. If the issue can be screened from the USQ process (i.e., all applicable questions are answered “No”), a short explanation in support of this determination should be provided in B.3, “Supporting Evidence for Exclusion.”

3. If any question in Sections I through IV was answered “Yes”, then the issue could potentially involve a USQ and a safety evaluation should be performed.

B.3 Supporting Evidence for Exclusion

It is recommended that justification be provided if an issue is screened from the process. Provide any supporting evidence, including amplification of any answers to the questionnaire, to support any exclusion from further consideration in the USQ process.

Questionnaire Summary

Facility Name: _____

Issue: _____

_____

☐ The issue requires a safety evaluation. The associated safety evaluation number is No. _____

☐ The issue does not require a safety evaluation.

Completed by: _____ Date _____

Reviewed by: _____ Date _____

Approved by: _____ Date _____

Appendix C

Safety Evaluation Worksheet

This first two pages of this appendix are only a summary worksheet. They should be completed after reviewing the "Guidelines for Summary of Safety Evaluation Worksheet," which begins on p. 35.

Safety Evaluation No:

Title:

This USQ determination is based on a safety evaluation, which consists of the summary questions below and responses and an attachment that provides the basis for the summary. The attachment consists of four sections: Introduction; Part I, Impact on Accidents; Part II, Potential for Creation of a New Type of Accident or Unanalyzed Event, and Part III, Impact on the Margin of Safety and on TSRs or OSRs.

Summary questions	Yes	No
Part I, Item 2: Does the issue increase the consequences of an accident previously evaluated?	❑	❑
Part I, Item 4: Does the issue increase the probability of an accident previously evaluated?	❑	❑
Part I, Item 6: Does the issue increase the probability of a malfunction of equipment important to safety?	❑	❑
Part I Item 7: Does the issue degrade the performance of equipment important to safety below that assumed in the existing analysis?	❑	❑
Part II: Does the issue create the potential for a new type of accident or malfunction?	❑	❑
Part III, Item 2: Does the issue reduce any margin of safety?	❑	❑
Part III, Item 3: Does the issue require any new TSRs?	❑	❑

On the basis of the previous questions, this issue

☐ does not constitute a USQ (all answers are no)

☐ does constitute a USQ (one or more yes answers)

Prepared by _____

Print name Title

_____

Signature Date

Reviewed by _____

Print name Title

_____

Signature Date

Approved by _____

Print name Title

_____

Signature Date

Guidelines for Summary of Safety Evaluation Worksheet

The sections below must be addressed in the supporting attachments to the Safety Evaluation Worksheet. The background information on p. 37 will provide guidance through these sections.

Introduction

A general introductory discussion should include

- a description of the aspects of the issue being evaluated and its expected effects;
- identification of parameters and systems affected by the issue;
- identification of the credible failures associated with the issue.

Part I. Impact on Accidents

1. Identify the accidents reviewed for potential impact by the issue.
2. Discuss how the parameters and systems affected by the issue impact the consequences of the accident(s) identified in I-1 above.
3. Identify the accidents whose probability of occurrence can be impacted by the issue, or for which the issue can be considered an initiating event.
4. Discuss the impact of the issue on the probability of occurrence of the accidents identified in I-3 above.
5. Identify the equipment important to safety affected by the issue.
6. Discuss the impact of the issue and/or failures associated with the issue on the probability of malfunction of the equipment identified in I-5 above.
7. Discuss how the issue impacts the performance of the equipment important to safety identified in I-5 above relative to the release of hazardous or radioactive materials and relative to the consequences that could result from a malfunction.

Part II. Potential for Creating a New Type of Accident or Malfunction

1. Discuss the impact of the issue and/or failures associated with the issue, and determine whether the impact has modified the facility response to the point where an accident of a different type must be considered.

2. Determine whether the issue or failures associated with the issue increases the probability of an accident previously considered incredible to the point where it should be considered within the authorization. Discuss the basis for this determination.

3. Discuss whether the impact of the issue and/or failures associated with the issue contribute to failures of equipment important to safety such that a malfunction of a different type is created.

4. Determine whether the issue or failures associated with the issue increased the probability of a malfunction of equipment important to safety previously considered incredible to the point where it should be considered within the authorization. Discuss the basis for this determination.

Part III: Impact on the Margin of Safety and on TSRs or OSRs

1. Identify the margins of safety related to this issue.

2. Discuss how the issue may impact the consequences of accidents, acceptance limits, and margins of safety.

3. Determine if any new TSRs or OSRs are required.

Any change to the TSR or OSR, including the development of new TSRs or OSRs, requires DOE approval. Such changes must be made in accordance with DOE Order 5480.22.

References

List the references used to perform the safety evaluation.

Background Information for Safety Evaluation Worksheet

Consideration of the questions below will help provide the necessary input for the Safety Evaluation Worksheet.

Part I. Impact on the Accidents

Item 2. Could the proposed activity increase the consequences of an accident previously evaluated in the safety analyses?

Approach

1. Determine which of the accidents evaluated in the safety analyses may be affected by the proposed activity (i.e., item I-1 of the Safety Evaluation Worksheet).

2. Determine if any of these accidents may have their radiological and/or hazardous material consequences altered as a direct or indirect result of the issue.

3. Determine whether the consequences of the accident(s) will be increased by the proposed activity.

An increase in consequences must involve an increase in hazardous material concentrations and/or radioactive doses above the bounding consequences in the authorization basis. Often, the SAR will identify a family of similar accidents, each resulting from a different scenario, with one having consequences enveloping all. The bounding consequence of the family serves as the basis for comparison. If a lesser consequence accident in the family is found to have a greater consequence as a result of a change, this would only be an increase in consequences for the purpose of the USQ evaluation if the new consequences exceed the bounding consequences for the family of accidents.

If not explicitly evaluated in the SAR (and therefore there is nothing against which to compare), onsite consequences that may involve a USQ are those that have not been previously identified as restricting access to vital areas or otherwise impeding actions to mitigate the consequences of an accident.

The following questions will help the analyst determine whether the consequences of an accident would increase:

- Will the proposed activity alter any assumptions previously made in evaluating the radiological and hazardous material consequences in the accident analyses?

- Will the proposed activity affect any radioactive or hazardous material barriers?

- Will the proposed activity change, degrade, or prevent actions described or assumed in the accident analyses?

Item 4. Could the proposed activity increase the probability of occurrence of an accident previously evaluated in the safety analyses?

Approach

1. Determine which of the accidents evaluated in the safety analyses may have their frequency of occurrence affected by the proposed activity (i.e., item I-3 on the Safety Evaluation Worksheet).

2. Determine whether the likelihood of occurrence of the accident(s) would be increased.

Event frequency classes may be defined as follows:

- **Incredible event.** Probability of occurrence is so small that events of this type are not considered in the design or SAR accident analysis; if quantified, $< 10^{-6}$ yr^{-1}.

- **Extremely unlikely event.** Occurrence of the event is very low; it is not expected to occur during the life of the facility or operation; if quantified, $10^{-4} - 10^{-6}$ yr^{-1}.

- **Unlikely event.** Occurrence of the event is low; it is not expected to occur, but may occur during the life of the facility or operation; if quantified, $10^{-2} - 10^{-4}$ yr^{-1}.

- **Anticipated event.** The event may occur during the facility or operation lifetime; if quantified, $10^{-1} - 10^{-2}$ yr^{-1}.

- **Normal operation event.** The event is likely to occur several times during the facility or operation lifetime; if quantified, $> 10^{-1}$ yr^{-1}.

For Category 3 facilities, this rating scheme can be used to qualitatively attach a probability rating to an event. The determination of a probability increase for Category 3 facilities is based on a qualitative assessment, which uses engineering evaluations consistent with the original safety analysis assumptions. For Category 2 facilities, actual numerical values may be associated with event probabilities, and increases in probabilities will be more easily identified. Changes result in an increase in the probability of occurrence of an accident, for the purpose of USQ determination, only if there is a clearly discernible increasing trend. This may be more obvious if the frequency of occurrence of an event increases such that it changes from one frequency class to a more frequent class. Changes within a frequency class require more judgment. If the event frequency is quantified, an increase in probability in the range of 5 to 10 times should be used as a guide for judging whether there is a clearly dis-

cernible increasing trend. For example, if the frequency of an event is originally determined to be 5.3×10^{-4} yr^{-1}, and as a result of a change the frequency is reevaluated to be 5.4×10^{-4} yr^{-1}, this would not be considered a clearly discernible increasing trend. Hence, there would be no increase in the frequency of occurrence for the purpose of the USQ evaluation. If the new event frequency was determined to be 5.3×10^{-3} yr^{-1}, this would represent a clearly discernible increasing trend. Then there would be an increase in the frequency of occurrence.

The following questions will help the analyst determine whether an event probability will increase.

- Will the proposed activity or change result in less stringent design, material, and construction standards applicable to the system or equipment being modified?
  - — Are the seismic specifications less stringent (e.g., consider supports, lugging at terminals, and lifted leads)?
  - — Are the environmental qualification criteria less stringent (e.g., are materials inappropriate for the radiation or thermal environment in which they will be used?)

- Will the proposed activity or change degrade overall system performance?
  - — Will the proposed activity or change use instruments with less accuracy or with slower response characteristics?
  - — Will the proposed activity or change cause systems to be operated outside their design or testing limits (e.g., additional loads on electrical systems, operating a piping system at higher than normal pressure, operating a motor outside of its rated voltage and amperage)?
  - — Will the proposed activity or change cause system vibration or water hammer, fatigue, corrosion, thermal cycling, or degradation of the environment beyond design limits?
  - — Will the proposed activity or change degrade any system interface?

The safety evaluation does not necessarily require quantification of probabilities if suitable arguments can be made to support the claim that the probabilities will not change. For example, if a change involves new equipment designed and procured to the same requirements as the components being replaced, and which will be functionally identical to the original components, a statement to this effect (with supporting references) would be adequate to support the claim that no change in the probability of accidents associated with the equipment would be expected.

Item 6. Could the proposed activity increase the probability of occurrence of a malfunction of equipment important to safety that was previously evaluated in the safety analyses?

Approach

1. Determine what equipment important to safety could be impacted by the proposed activity (i.e., item I-5 in the Safety Evaluation Worksheet).

2. Evaluate the effects of the activity on equipment important to safety, including both direct and indirect effects (direct effects are those where the issue affects the equipment; indirect effects are those where the issue impacts another piece of non-safety equipment, and this piece of equipment affects the equipment important to safety).

3. Determine if an increase in the probability of a malfunction of the equipment important to safety could occur.

The accident analysis may assume the proper functioning of some portion of equipment important to safety in demonstrating the adequacy of design. The proper functioning of other SSCs, although not specifically identified in the accident analysis, is credited in an indirect sense. The bounds of the accident analysis are extended to include these SSCs. For example, a change that does either of the following is a change that increases the probability of the equipment important to safety malfunctioning:

- Degrades the performance of equipment important to safety assumed to function in the accident analysis to below that predicted in the authorization basis.

- Increases challenges by other SSCs to the capabilities of equipment important to safety assumed to function in the accident analysis such that performance is degraded to below that predicted in the authorization basis.

An increase in the probability of a malfunction occurring for Category 3 facilities is determined by using a qualitative engineering evaluation. A more detailed and quantified analysis may be appropriate for Category 2 facilities.

The questions below will help the analyst determine whether the probability of a malfunction would increase for any equipment important to safety.

- Will the proposed activity or change result in less stringent design specifications for materials and construction practices when the following questions are considered?
  - — Are the seismic specifications less stringent (e.g., consider supports, lugging at terminals, and lifted leads)?

— Are the environmental qualification criteria less stringent (e.g., are materials inappropriate for the radiation or thermal environment in which they will be used?)

- Will the proposed activity or change degrade the structure, system, or component reliability by
  - — imposing additional loads not analyzed in the original design?
  - — deleting or modifying system equipment protection features?
  - — downgrading the support system performance necessary for reliable operation of equipment important to safety?
  - — reducing system equipment redundancy or independence?
  - — increasing the frequency of operation of equipment important to safety?
  - — imposing increased or more severe testing requirements on equipment important to safety?

The safety evaluation does not necessarily require quantification of probabilities if suitable arguments can be made to support the claim that probabilities will not change. For example, if a change involves new equipment designed and procured to the same requirements as the components being replaced, and that will be functionally identical to the original components, a statement to this effect (with supporting references) would be adequate to support the claim that no change in the probability of malfunctions associated with the equipment would be expected.

Item 7. Could the proposed activity increase the consequences of a malfunction of equipment important to safety that was previously evaluated in the safety analyses?

Approach

1. Determine what equipment important to safety could be impacted by the proposed activity (i.e., item I-5 on the Safety Evaluation Worksheet).

2. Evaluate the effects (both direct and indirect) of this activity on equipment important to safety.

3. Determine if any of these effects could alter radiological or hazardous material releases.

4. Determine if the consequences resulting from a malfunction of equipment important to safety could be increased.

The discussion associated with item I-2 applies here for determining what constitutes an increase in consequences.

Part II. Potential for Creating New Type of Accident or Unanalyzed Event

Items 1 and 2. Could the proposed activity create the possibility of an accident of a different type than any previously evaluated in the safety analyses?

Approach

1. Determine the types of accidents evaluated in the safety analyses.
2. Identify the types of credible accidents that the issue could create.
3. Compare the two lists to determine if the issue could lead to an accident of a different type from the types evaluated in safety analyses.

An accident that involves an initiator or a failure not considered in the facility safety analyses is potentially an accident of a different type. Possible accidents of a different type are limited to accidents that are as likely to occur as those considered in the authorization basis. If a change results in a newly discovered accident, or increases the probability of an accident previously thought incredible to make it as likely as the accident(s) considered in the authorization basis, a possible accident of a different type is created. Certain accidents are not treated in the safety analyses because their effects are bounded by other related events that are analyzed. If the proposed activity introduces an accident that is bounded by other similar events in the safety analyses, that activity should not be considered an accident of a different type.

Items 3 and 4. Could the proposed activity create the possibility of a malfunction of equipment important to safety of a different type than any previously evaluated in the safety analyses?

Approach

1. Identify the types of failure modes of equipment important to safety affected by the issue that previously have been evaluated in safety analyses.
2. Identify the types of failure modes that the issue could create.
3. Compare the two lists to determine if the issue could lead to a failure mode of a different type than the types evaluated in safety analyses.

A malfunction that involves an initiator or failure not considered in the facility safety analyses is potentially a malfunction of a different type. Possible malfunctions of a different type are limited to those that are as likely to occur as those considered in the authorization basis. A possible malfunction of a different type could be created by a change that adds a different type or more likely failure path than previously identified. Certain malfunctions are not

treated in the safety analyses because their effects are bounded by other related events that are analyzed. If the proposed activity introduces a malfunction that is bounded by other similar events in the safety analyses, that activity should not be considered a malfunction of a different type.

Part III. Impact on the Margin of Safety and on TSRs or OSRs

Items 1–3. Does the proposed activity reduce any margin of safety, change the basis for any TSR, or require a new TSR?

Approach

1. Determine whether any TSR or OSR is impacted by the issue.
2. Determine whether the bases of any TSR or OSR are involved (see the "Bases" section of the TSR).
3. Determine if any basis change will impact the acceptance limit (and hence, any margin of safety).
4. Determine if the change requires a new TSR or OSR.

Technical safety requirements set forth the minimum acceptable limits for operation under normal and specified failure conditions; they ensure that the available equipment and initial conditions meet the assumptions in the accident analysis. TSRs are a distillation of those aspects of the SAR that are required to ensure the performance of SSCs and personnel as relied upon and defined in the SAR. Any new TSR should be derived in accordance with DOE Order 5480.22. The bases for TSRs define acceptance limits from which margins of safety may be determined. The margin of safety is that range of parameter values above the acceptance limit (maximum value in the authorization basis) but below a critical value of safety significance (e.g., failure criterion or the value corresponding to a regulatory limit).

If the bases for TSRs do not specifically address a margin of safety, then the safety analyses and other appropriate authorization basis documents should be reviewed to determine whether the proposed change, test or experiment, or new information has or would result in a reduction in a margin of safety. The margins are based on assumptions of initial conditions, conservatism in computer modeling and codes, allowance for instrument drift and system response time, redundancy and independence of components in safety trains, and facility response during operating transient and accident conditions.

When making the judgment on whether a margin is reduced, the decision should be based on the physical parameters or conditions that can be observed or calculated. If a change in the margin is calculated to be very small (i.e., just

a few percent, such that no clear trend is obvious), and uncertainties are very large, the change need not be considered as a reduction in margin.

A change in initial conditions, in a system response time, or in some other parameter affecting the course of an accident analysis supporting the bases of TSRs must be evaluated to determine whether that change causes the acceptance limit to be exceeded for the analysis. If this limit is exceeded, the change involves a reduction in the margin of safety. A reduction in the margin may occur automatically, for example, if the consequences are increased as a result of the issue. This could be the case for an inventory-based TSR established to ensure an initial condition for a bounding accident. If a change requires that a greater inventory be present and all of this is potentially subject to accident conditions, and all other relevant parameters are the same, the consequences would increase above the acceptance limit. This change would involve a USQ based on increased consequences. The margin of safety can be defined as the difference between the maximum inventory / dose in the authorization basis (i.e., acceptance limit) and the inventory corresponding to a dose of significance (e.g., regulatory limit or evaluation guideline). In this case, an increase in the consequences would result in a reduction in the margin of safety because the acceptance limit would be exceeded. Thus, the presence of a greater inventory would also involve a USQ based on a reduction in the margin of safety.

Appendix D

Examples of USQ Determination

Example 1—USQ Determination for Building X

Safety Evaluation No: X-94-001

Title: Control Console Project—Continuous Air Monitors (CAMs)

This USQ determination is based on a safety evaluation which consists of summary questions, responses, and an attachment that provides the basis for the summary. The attachment consists four parts: Introduction; Part I, Impact on Accidents; Part II, Potential for Creating a New Type of Accident; and Part III, Impact on the Margin of Safety and on TSRs or OSRs.

Summary questions	Yes	No
Part I, Item 2: Does the issue increase the consequences of an accident previously evaluated?	☐	☑
Part I, Item 4: Does the issue increase the probability of an accident previously evaluated?	☐	☑
Part I, Item 6: Does the issue increase the probability of a malfunction of equipment important to safety?	☐	☑
Part I, Item 7: Does the issue degrade the performance of equipment important to safety below that assumed in the existing analysis?	☐	☑
Part II: Does the issue create the potential for a new type of accident or malfunction?	☐	☑
Part III, Item 2: Does the issue reduce any margin of safety?	☐	☑
Part III, Item 3: Does the issue require any new TSRs?	☐	☑

On the basis of the previous questions, this issue

☑ does not constitute a USQ (all answers are “No”)

☐ does constitute a USQ (one or more answers are “Yes”)

Prepared by _____

Print name Title

_____

Signature Date

Reviewed by _____

Print name Title

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Signature Date

Approved by _____

Print name Title

_____

Signature Date

Attachment: Basis for Summary

Safety Evaluation Number: X-94-001

Title: Control Console Project—Room Continuous Air Monitors (CAMs) **Date**: 1/1/94

Introduction

1. Describe the aspects of the issue being evaluated.

   The control console is an alarm-signaling device recently placed in the control room to help facility operators evaluate the building's system performance. It is intended to provide alarm status and listings of probable causes for alarms received. The control console is not a safety class item and is not required to operate during or after an earthquake. The control console may include alarm signals and control functions for systems or equipment that do not mitigate accident consequences. However, it does not include any control functions for systems or equipment that mitigate accident consequences. The alarm signals for systems or equipment that must be operational during an accident may be connected to the control console; they may also alarm in the control room or in the Emergency Dispatch Center.

   This part of the Control Console Project consists of connecting the room CAMs alarm signal to the control console. The existing room CAMs are assumed to function in Building X's Safety Analysis Report. The signal is automatically transmitted to the control room in Building X and the Emergency Dispatch Center. A part of the project will remove existing room CAMs status alarm from the control room and re-route the signal to the new control console. The signal will continue to transmit to the Emergency Dispatch Center. No control functions of the CAMs are involved.

2. Identify the parameters and systems affected by the issue.

   This part of the Control Console Project concerns the relocation of one of the delivery points of the room CAMs signal. The performance of the CAMs will not be affected by adding the room CAMs alarms to the control console, nor will re-routing alter the internal components of the monitors. The operability of the CAMs will not be impacted.

3. Identify the credible failures associated with the issue.

   There are no credible failures associated with the issue that affect the functionality of the room CAMs alarm system. Failure of the control console will not affect the existing alarm functions. However, a failure or malfunction in the control console could result in (a) failure of the redundant monitoring capability to provide alarm information to facility personnel, or (b) transmission of a false signal to the control console. In the event of a control console failure, the room CAMs will still provide the safety function to notify personnel of airborne activity and the need to evacuate the RMA room. The Emergency Dispatch Center will also be notified of the airborne activity.

Part I. Impact on Accidents

1. Identify the accidents reviewed for potential impact by the issue.

   The SAR (Building X's) was reviewed to determine which bounding accidents could be impacted by this change. Because the change involves the CAMs, accidents that result in radioactive material becoming airborne and which require the CAMs to alarm to warn workers of the hazard, could be affected. The accidents that are potentially impacted by the issue are Radioactive Fire and Radioactive Spill accidents.

2. Discuss how the parameters and systems affected by the issue impact the consequences of the accidents identified above.

   None of the parameters or systems involved in this issue impact the consequences of these accidents. Re-routing of the signal will not affect the performance of the CAMs. The room CAMs are for notifying room personnel of airborne particulates and for signaling the need to evacuate the room. These CAMs will continue to audibly alarm until the airborne particulate is removed from the space. Workers are trained to evacuate an area upon hearing the CAMs alarm. The response for false alarms is the same as for real alarms. The failure modes of the control console will not affect the response of emergency response personnel because the signal will continue to be transmitted to the Emergency Dispatch Center. The actions of facility personnel (other than workers evacuating the affected room) or the actions of Emergency Response personnel are not considered in the accident analysis. There is no impact on the consequences of accidents described in the SAR from failure of the control console.

3. Identify the accidents whose probability of occurrence can be impacted by the issue, or for which the issue can be considered an initiating event.

The accidents that are potentially impacted by the issue are the Radioactive Fire and the Radioactive Spill accidents.

4. Discuss the impact of the issue on the probability of occurrence of the accidents identified above.

   No accident probabilities will be impacted by the issue. None of the failure modes associated with the issue will initiate an accident.

5. Identify the equipment important to safety that is affected by the issue.

   The room CAMs alarm system is affected by the issue. The room alarm is not being modified; only the ultimate delivery point of the signal is being changed.

6. Discuss the impact of the issue and/or the failures associated with the issue on the probability of occurrence of a malfunction of the equipment identified above.

   The probability of a malfunction of the room CAMs alarm system will not be increased by the redirection of the alarm signal. The room CAMs will continue to operate and provide the safety function, even though the alarm signal is re-routed to the control console. The CAMs will be left in the same condition after this modification. Failure of the control console will not affect the existing alarm functions.

7. Discuss the impact of the issue on the performance of equipment important to safety identified relative to the release of hazardous or radioactive materials and to the consequences that could result from a malfunction.

   As described previously, the redirection of the alarm signal will not affect the performance of the room CAMs alarm system. A malfunction of the control console will not affect the performance of the room CAMs. There is no impact on radioactive or hazardous material from this change or from any malfunction associated with this change.

Part II. Potential for Creating New Type of Accident or Malfunction

1. Discuss the impact of the issue and/or failures associated with the issue, and determine whether the impact has modified the facility response to the point where an accident of a different type must be considered.

   The only change is the redirection of signals from the room CAMs to the new control console. The performance of the CAMs is not affected by this change. The change does not impact any hazardous or radioactive material

or any dispersive energy sources. No new events resulting in release are created.

2. Determine whether the issue or failures associated with the change would increase the probability of an accident previously considered incredible to the point where that change should be reconsidered within the authorization basis.

   Re-routing of the CAMs signal will not impact the performance of the CAMs, nor will redirection of the room CAMs signal alter accident probabilities.

3. Discuss whether the impact of the issue and/or failures associated with the issue contribute to failures of equipment important to safety such that a malfunction of a different type is created.

   No new types of malfunction exist for the redirection of signals from the room CAMs to the new control console. The performance of the CAMs is not affected by this change.

4. Determine whether the issue or failures associated with the issue increase the probability of a malfunction of equipment important to safety and previously considered incredible to the point where it should be reconsidered within the authorization basis**.**

   There is no increase in the probability of a malfunction. The re-routing of the CAMs signal will not impact the performance of the CAMs.

Part III. Impact on the Margin of Safety and on TSRs or OSRs

1. Identify the margins of safety related to this issue.

   No margins of safety are affected by the issue.

2. Discuss how the issue may impact the consequences of accidents, acceptance limits, and margins of safety.

   No margins of safety are affected; therefore, there is no decrease in any margin of safety. The TSRs are not affected by this project.

3. Determine if any new TSRs is required.

   No new TSRs are needed.

Example 2—USQ Determination for Building X

USQ No: X-94-002

Title: Hot Cell Exhaust

This USQ determination is based on a safety evaluation which consists of the summary questions, responses, and an attachment that provides the basis for the summary. The attachment consists four parts: Introduction; Part I, Impact on Accidents; Part II, Potential for Creation of New Type of Unanalyzed Event; and Part III, Impact on the Margin of Safety and on TSRs or OSRs.

Summary questions	Yes	No
Part I, Item 2: Does the issue increase the consequences of an accident previously evaluated?	☑	☐
Part I, Item 4: Does the issue increase the probability of an accident previously evaluated?	☐	☑
Part I, Item 6: Does the issue increase the probability of a malfunction of equipment important to safety?	☐	☑
Part I, Item 7: Does the issue degrade the performance of equipment important to safety below that assumed in the existing analysis?	☐	☑
Part II: Does the issue create the potential for a new type of accident or malfunction?	☐	☑
Part III, Item 2: Does the issue reduce any margin of safety	☑	☐
Part III, Item 3: Does the issue require any new TSRs?	☐	☑

On the basis of the previous questions, this issue

☐ does not constitute a USQ (all answers are “No”)

☑ does constitute a USQ (one or more answers are “Yes”)

Prepared by _____

Print name Title

_____

Signature Date

Reviewed by _____

Print name Title

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Signature Date

Approved by _____

Print name Title

_____

Signature Date

Attachment: Basis for Summary

Safety Evaluation Number: X-94-001

Title: Hot Cell "A" Exhaust Modification **Date**: 1/2/94

Introduction

1. Describe the aspects of the issue being evaluated.

   The change being evaluated is the addition of an exhaust fan, filter, and associated ductwork in parallel with the existing fan and filter for Hot Cell "A" in Building X. The system requirements document[1] indicates that the added components will have capabilities identical to existing components. The new components will be designed and procured to the same codes, standards, and loadings as the existing components. The new fan and filter will be supplied by the same manufacturer and be the same model as the existing components.

   These exhaust fans maintain Hot Cell "A" at a negative pressure with respect to atmosphere during normal operations and accidents. Keeping Hot Cell "A" at a negative pressure ensures that any air leakage is in, not out, of the Hot Cell. This is desirable because the facility is adjacent to an area that has a very high population of workers. The filters in the ventilation system will remove most of the radioactive powder that could be released in the event of an accident. In-leakage to the facility and an elevated release point will minimize local consequences.

2. Identify the parameters and systems affected by the issue.

   The ventilation system currently consists of one exhaust fan and filter. The existing exhaust fan and filter cannot maintain the Hot Cell at a negative pressure that is sufficient. It has been determined that a second fan and filter should be added to the ventilation system. This requires the existing ductwork to be cut to allow the ductwork associated with the new fan and filter to be welded in. The new fan, filter, and ductwork will (1) be of the same materials; (2) be designed to the same codes and standards as the existing ductwork; (3) have the same capacities as the existing components; (4) be supplied by the same manufacturer and be the same model as the existing components; and (5) be powered from the same electrical distribution board as the existing fan. Backdraft dampers are provided with the new and existing fans.

   The potential effects of this change on the facility are an increase in the flow rate from the hot cell, a decrease in the pressure within the hot cell,

and a possibly increase in the offsite doses. The magnitude of the changes in pressure and doses needs to be determined or bounded. The ability of the hot cell and ductwork to withstand the increased negative pressure should be demonstrated. Addition of the exhaust fan will increase the loading on the electrical distribution board, resulting in an increase in thermal loading in the room that contains the fans and filters. The added components may also increase the radiation levels from the radioactive materials flowing through, and being deposited on, the components.

3. Identify the credible failures associated with the issue.

   Failure of the new system will result in a lower differential pressure between the hot cell and the environment than would be desired. Addition of the new system provides redundancy. If the filters associated with one system are degraded, the other system would still be available.

Part I. Impact on Accidents

1. Identify the accidents reviewed for potential impact by the issue.

   The SAR (Building X's) was reviewed to determine which bounding accidents could be impacted by the change. Because the hot cell exhaust system maintains the hot cell at a negative pressure with respect to atmosphere and exhausts air from the hot cell, only accidents that result in radioactive material becoming airborne could be impacted by this change. In the SAR for Building X, the bounding accident for radioactive material becoming airborne in hot cell "A" is dropping a container with 100 g of radioactive powder.

2. Discuss how the parameters and systems affected by the issue impact the consequences of the accident(s) identified above.

   Addition of another exhaust fan could increase the exhaust flow rate from hot cell "A." If a container with radioactive powder were dropped, the powder could become airborne in this cell. Even though the increased exhaust flow is filtered, offsite individuals could be exposed to higher radiation doses. This would occur because the radioactive material would have less residence time in the facility; thus, there would be less time for decay before discharge. The offsite dose (600 m) was previously calculated to be 140 mrem. The newly calculated dose is 210 mrem. The dose within the immediate vicinity of the hot cell would be reduced by the increase exhaust flow because there would be less air leakage from the hot cell, if a spill of radioactive material occurred.

3. Identify the accidents whose probability of occurrence can be impacted by the issue or for which the issue can be considered an initiating event.

   The accident impacted is a spill of radioactive material.

4. Discuss the impact of the issue on the probability of occurrence of the accidents identified above.

   The ventilation system cannot contribute to the initiation of this event. The accident in the SAR assumed operation of the current ventilation system. The fact that there will be an identical system on-line provides redundancy. The probability of a release occurring without the benefit of an unfiltered and elevated release point would be reduced by this change.

5. Identify the equipment important to safety affected by the issue

   The exhaust system (fans, filter, and ductwork) is important to safety and could be affected by the change. The exhaust system is required to mitigate the consequences of dropping a container with radioactive powder. Any equipment located in the same room as the existing and new exhaust fans, filters, and ductwork could be affected by increased room temperature and increased radiation resulting from the new equipment. (The increase in radiation results from the increase in radioactive material, which could potentially flow through and deposit in the exhaust system.) The affected safety-related equipment includes both fans and their associated power supply. The power supply and electrical system were confirmed to have the capability to easily support both fans.[2]

   The performance of other equipment, although not safety related, may be impacted by the increase in thermal and radiation levels. Calculations[3,4] were performed to demonstrate that the added equipment will not increase the room temperature or radiation levels above the values used for design of any affected equipment.

   Calculations[4] for the radiation levels in the equipment room still allow unprotected worker access. If the ventilation system equipment must be opened, however, worker protection would be required. This was the case before, so addition of the new equipment does not result in a new requirement for maintenance.

   With both fans operating, the ductwork and the structure of hot cell “A” would be subjected to slightly more negative pressures. The effect of this slight increase in negative pressure on the structure would be negligible. Reference 5 gives calculations of the negative pressure in the ductwork, including information on the ability of the ductwork to withstand the negative pressure.

6. Discuss the impact of the issue and/or the failures associated with the issue on the probability of occurrence of a malfunction of the equipment identified above.

   The added components will be designed and procured to the same criteria as the existing components and will be functionally identical. The presence of backdraft dampers associated with the fans will prevent any backflow through an inoperative fan. Reference 2 shows that the electrical system is capable of supplying both fans with ample power without overloading the system. The reliability of the electrical system would not be affected by the increased load.

   References 3 and 4 indicate that the thermal and radiation environments will not contribute to a malfunction because all conditions are well within the acceptable range. The calculation of the maximum negative pressure the exhaust ductwork and structure of hot cell "A" would experience with both fans running would be 0.5 in. of water.[5] This value is well within the capability of the ductwork and structure to withstand negative pressure. Therefore, this change will not increase the probability of a malfunction of the equipment important to safety.

7. Discuss the impact of the issue on the performance of equipment important to safety identified above relative to the release of hazardous or radioactive materials and to the consequences that could result from a malfunction.

   As discussed above, there are no negative effects on the performance of any equipment important to safety from this change. The addition of a parallel exhaust system will change the impact of the bounding accident as discussed in I-2. The existence of two exhaust paths provides redundancy. Failure of one exhaust path will result in a condition as described in the present SAR: local consequences would be greater and offsite consequences would be lower than if both systems were operating.

Part II. Potential for Creating New Type of Accident or Malfunction

1. Discuss the impact of the issue and/or failures associated with the issue, and determine whether the impact has modified the facility response to the point where an accident of a different type must be considered.

   The addition of an exhaust fan, filter, and associated ductwork will not change the response of the facility so that a new type of accident is created. The only effects of the modification are to increase the flow rate of air being exhausted from the hot cell. Part I addressed the potential for increased offsite radiation doses, increased radiation dose rate within the

facility, failures from increased (a) demand on the electrical system, (b) thermal loading in the room that contains the new and existing exhaust equipment, and (c) negative pressure in the hot cell and exhaust ductwork. These potential problems are shown not to cause the facility to exceed its authorization basis. No new events that result in release are created.

2. Determine whether the issue or failures associated with the change increase the probability of an accident previously considered incredible to the point where the change should be considered within the authorization basis.

   The components being added are designed and procured to the same requirement as the existing components. No new failure modes are created. No equipment important to safety will be negatively affected by this change.

3. Discuss whether the impact of the issue and/or failures associated with the change contribute to failures of equipment important to safety such that a malfunction of a different type is created.

   The equipment to be added is functionally identical to the existing equipment. No new type of malfunction is introduced.

4. Determine whether the issue or failures associated with the change increase the probability of a malfunction of equipment important to safety previously considered incredible to the point where the change should be considered within the authorization basis.

   The equipment to be added is functionally identical to the existing equipment. The electrical system was determined to function with the same reliability despite the increased load. The probability of any malfunction would not be increased.

Part III. Impact on the Margin of Safety or on TSRs

1. Identify the margins of safety related to this issue.

   The hot cell has two TSRs related to this issue: one to the inventory in use at the facility; the other to the minimum pressure differential between the facility and the atmosphere.

2. Discuss how the issue may impact the consequences of accidents, acceptance limits, and margins of safety.

   The SAR calculates consequences based on an assumed inventory. These consequences are well within the evaluation guidelines adopted by the facility and are protected from being exceeded by a TSR. The margin of

safety is the difference between the maximum accident dose and the evaluation guidelines. The change to the exhaust system causes an increase in the maximum offsite dose. Thus, there is a reduction in the margin of safety associated with this TSR.

The TSR relating to pressure differential requires a minimum pressure differential of –1/4 in. water at any time powdered radioactive material is being handled. This change to the exhaust system will result in a greater pressure differential. The margin of safety related to this TSR would increase.

3. Determine if any new TSRs are required.

   No new TSRs are needed.

References used to perform the safety evaluation

1. Hot Cell "A" New Exhaust System Requirements
2. Verification of Adequacy of Power Supply and Electrical System for Addition of Second Exhaust Fan to Hot Cell "A"
3. Thermal Calculation for Hot Cell "A"
4. Radiation Calculation for Hot Cell "A"
5. Pressure and Structural Calculation for Hot Cell "A"